

GRACE FISH HATCHERY

ANNUAL REPORT

January 1, 1991 - December 31, 1991

Prepared by:

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INTRODUCTION

Grace State Fish Hatchery is located seven miles south of Grace, Idaho, and two miles east of Highway 34 in Caribou County. Middle and West Whiskey Creek Springs are the water sources for the hatchery. Water flow is 7 to 24 cfs with a year-round temperature of 52°F. A six-year drought has lowered the volume of water in the aquifer above the hatchery and, thus, spring flows have been on the lower end of the previously mentioned range during 1991.

The hatchery rears rainbow trout Oncorhynchus mykiss for distribution in the Bear River, Blackfoot River, and Snake River drainages. A small number of rainbow are planted on a statewide basis.

Bonneville cutthroat Oncorhynchus clarki utah are spawned on the Blackfoot River, and progeny are raised to *fingerlings* for distribution in Blackfoot Reservoir. During cutthroat trapping, the hatchery crew also removes suckers from the river in an effort to reduce undesirable fish in Blackfoot Reservoir.

Another trap is run by the hatchery on St. Charles Creek, a tributary of Bear Lake. Fish are measured, weighed, and placed above the weir or sent to Utah for spawntaking.

The hatchery raises a small number of splake (brook trout Salvelinus fontinalis x lake trout Salvelinus namaycush hybrid) for introduction into lakes in north Idaho that need to have stunted brook trout eliminated. These fish are planted to take on the role of a predator, but are limited population-wise in these lakes because they are sterile.

The hatchery is funded by fees paid for Idaho *hunting* and fishing licenses. The St. Charles Creek trapping operation is funded by Dingell-Johnson monies.

HATCHERY DESIGN

Grace Fish Hatchery exclusively uses cement rearing ponds. Early rearing is done in 16 vats contained in the hatchery building (Figure 1). These vats each have a rearing volume of 36.3 cubic feet.

There are 16 small raceways located west of the vat building which are oriented so the water runs from west to east (Figure 2). The orientation keeps sunlight in the raceways minimized and, thus, allows us to rear cutthroat under low-light, low-stress conditions. Each small raceway has a rearing volume of 365 cubic feet.

Southeast of the small raceways, there are four north-south running raceways. These raceways are called the mediums and are used for early rearing of rainbow and for fingerling production. These raceways each have a rearing volume of 1,024 cubic feet.

Final rearing of catchable rainbow is done in the east-west running large raceways that are located on the southernmost portion of the hatchery (Figure 2). These raceways each have 7,500 cubic feet of rearing space. There are six of these raceways, but we presently are only using four of them because of low water flows caused by the drought. The water supply for these large raceways is reused from the upper hatchery raceways and vats.

FISH PRODUCTION

During the 1991 calendar year, Grace Hatchery produced 2,142,975 fish, of which 1,166,031 were planted and 976,944 were on station at the end of December 1991 (Table 1).

Rainbow trout raised at the hatchery were Shepherd of the Hills strain, attained from Utah and Hayspur strain. Shepherd of the Hills strain rainbow trout are spring spawners, which have the possibility of interbreeding with native cutthroat trout populations found in the Grace Fish Hatchery planting area. This strain typically produces a high level of precocial males and, for the latter two reasons, its use will be discontinued at Grace Fish Hatchery.

The Hayspur strain rainbow trout were attained from Idaho Department of Fish and Game's Hayspur Broodstock Facility. This rainbow trout strain will be the main production fish at Grace Fish Hatchery in the future. Hayspur strain rainbow trout are desirable in Southeast Idaho because they are fall spawners and, thus, will not interbreed with native cutthroat trout populations. These fish have also been shown to have a higher return-to-the-creel than other rainbow trout strains. These fish handle well, and most lots have a low level of precocial males.

The Bonneville cutthroat trout we raise are from the hatchery fish introduced into Blackfoot Reservoir during the 1980s. These fish originally came from the Swan Creek trap in Utah and, thus, originate from Bear Lake. Bonneville cutthroat trout are stocked as fingerlings in the Blackfoot River at the China Hat Trap Site.

Yellowstone cutthroat trout Oncorhynchus clarki bouvieri are hatched, left in the incubators until swim-up, and then planted. These fish come from the wild run of Yellowstone cutthroat trout in the Blackfoot River and are used to stock an underseeded tributary (Spring Creek) of the Blackfoot River that has excellent spawning substrate and nursery waters.

Catchable rainbow trout are raised for put-and-take philosophy fisheries. Fingerling rainbow trout are released into bodies of water with a put-grow-and-take philosophy. The fry plants have been used to reestablish wild runs.

Walleye Stizostedion vitreum fry were obtained from the Blind Pony Hatchery in Missouri, and sauger Stizostedion canadense fry were obtained from a hatchery

in Genoa, Wisconsin. These fish were never brought onto hatchery grounds, but rather were planted immediately after receipt into Oneida Reservoir.

None of the fish reared at Grace Fish Hatchery were transferred to other hatcheries. We did pick up 150 Ennis Hatchery broodstock from Montana for distribution into Lamont and Springfield reservoirs.

The overall cost/lb of fish at the hatchery for 1991 was \$0.86, and the average cost/fish was \$0.26. Catchables planted in 1991 averaged \$0.32/lb and \$0.13/fish. (Calendar year costs included only, not rearing costs accrued in 1990.) Catchables being held for the 1992 planting season cost \$1.77/lb, and \$0.38/fish (Table 2).

Fry costs (Hayspur rainbow trout on hand and Yellowstone cutthroat trout planted) averaged \$37.73/lb and \$0.17/fish. Spring fingerling plants (Hayspur rainbow trout and calendar year costs for the 1990 and 1991 lots of Bonneville cutthroat trout) average \$2.15/lb and \$0.73/fish. Fall plant fingerlings average \$1.53/lb and \$0.23/fish. All costs were calculated by first adding feed costs of each lot on a monthly basis. The remaining monthly costs (excluding feed) for each month were then split up and assigned to each lot in the same percent as the number of fish that particular lot made up of the entire population on the hatchery.

HATCHERY IMPROVEMENTS

Three major construction projects were undertaken at the hatchery in 1991. The small raceways were designed with two effluent drains, with one being used for collection of water for reuse in the large raceways and the other designed for flushing cleaning wastes to the settling pond during sweeping and, thus, bypassing the waste materials around the fish in final rearing. This cleaning line was not completed when the small raceways were built, but construction of the cleaning line was completed during the summer of 1991. A private contractor dug a trench from the small raceways to the settling pond and installed this cleaning pipe, so fecal materials can be bypassed around the large raceways. This should help maintain better water quality in the large raceways and reduce, if not eliminate, bacterial gill disease epizootics in the catchable trout raceways.

Middle Whiskey Creek was plumbed into the head box of the medium raceways. An 18-inch metal pipe was plumbed into the spring and run down to a valve which allows hatchery personnel to divert water from this spring to the large raceways or to the medium raceways. This modification will keep a flow in the medium raceways, even if the irrigators divert water away from the West Whiskey Creek Spring. In the past, the medium raceways could not be used after late May/early June because the Rassmussen Ditch irrigators took this water. This will increase our early rearing capacity and allow us lower rearing densities. The contractor that did this job also knocked an extra hole in the tail race wall of the large raceways so that the settling pond can be bypassed when it is being cleaned.

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The engineering crew built a permanent fish trap on St. Charles Creek by the county road on Charlie Hulmes' property. The structure is similar to the Blackfoot River Trap, and will use floating weir panels to block fish migration, and a cement trap box with metal pickets that insert into a metal frame. The hatchery crew fenced this trap so that Charlie Hulmes' cattle have a water supply in the winter months.

Numerous minor construction projects were undertaken by the hatchery crew and private contractors. Ultraviolet water treatment units were installed on all of the residences' domestic water lines and also in the office and crew's quarters. These improvements have made the tap water potable so that drinking water no longer has to be purchased. A warming shed was built around the ultraviolet unit for the crew's quarters so the pipes and water softener would not freeze and break.

The facade of the seven-stall shed was framed with 1 x 4 lumber to improve its appearance. The cement flume delivering water to the large raceways was covered with lumber for safety reasons, improved appearance, and also to shade out the growth of aquatic macrophytes. Hatchery roads were graded and covered with cinders. The West Whiskey Creek Spring collection pool was shaded with tarps after vegetation was removed. The tarps will shade the spring and should reduce plant growth that breaks off and comes down and plugs our screens.

Several improvements were made in the equipment used on the hatchery. A new 1-ton GMC 4 x 4 pickup with dual rear tires was purchased for fish planting and for plowing snow. Two old fish conveyers were modified for removing suckers from the Blackfoot River Trap. The tank on the 2-ton pickup was lowered 3.5 inches so that body sway on turns would be eliminated. An oxygen and fresh flow alarm system was also installed on this truck. A separate planting hose was built for the new 1-ton pickup. The old camper trailer used at St. Charles Creek was replaced with a new camper. A black light box for detecting grit marks at the St. Charles Creek Trap was built by the hatchery crew. An air spawning gun was built in cooperation with Hayspur Hatchery for use on the Blackfoot River.

Historical data from the hatchery was entered on databases built by the hatchery crew. This project is far from finished, and will be continued in future years.

The road to the hatchery often erodes during rainstorms and when snow is melting. Culverts need to be installed, or our neighbor should be encouraged to place the field above this road in the Cropland Reserve Program so that erosion is decreased. The corrugated metal shed covering the spring that supplies the vat room should be rebuilt because rotted support beams in this shed are falling off into the water and then going into pipes and blocking valves. The settling pond should be cleaned out and the dike on the south end of this pond rebuilt because muskrats have damaged and weakened this structure. A new wood burning stove pipe must be built in residence three because the old pipe is a fire hazard. The stove in residence two should be replaced because it lets out smoke every time the door is opened.

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FISH HEALTH

The largest number of mortalities at Grace Fish Hatchery occur during the first few months of ponding (Figures 3, 4). After early rearing, the mortalities consistently stayed below 1% per month. The higher mortality level during early rearing is attributable to broom mortality incurred during cleaning, deformities such as scoliosis, lordosis, and siamese twins, and to egg quality. Lot 91-ID-R9b (Figure 3) had a loss from swim-up to planting of 6.47%, which is typical of most rainbow trout lots raised at the hatchery.

Coldwater disease is the predominant pathogen at the hatchery and is responsible for most of the chronic, low-level mortality during final rearing and the latter part of early rearing. Fish dying from this disease have eroded caudal fins and/or lesions in the dorsal area posterior to the dorsal fin. Terramycin-treated feed is fed during early rearing as a prophylactic against the disease.

An experiment was conducted to evaluate the effectiveness of three types of coldwater disease treatments at Grace Fish Hatchery. Terramycin and oxalinic acid-treated feed was fed to rainbow trout fry eight days after initial feeding. The third group was treated with an autogenous bacterin vaccine applied when the fish were 1 g in size. A fourth group was used as a control.

No significant differences ($P. >.05$) were found among the treatments and controls. Episodes of the disease occurred randomly among the separate lots.

There was a correlation, however, between the disease incidence in the egg lots that the fish came from. Three lots of Hayspur eggs were used as replicates in the experiment. One lot was from 3-year-old parents and the other two lots were from 2-year-old parents. The replicates that were progeny of 3-year-old parents had significantly great ($P. (.05)$) mortality during the first 60 days of rearing regardless of the type of treatment. Periodic samples of tissue from each test group grown on TYE medium had a higher incidence of Flexibacter psychrophilus growth from fish that were progeny of 3-year-old parents. These results indicate that vertical transmission is a likely problem and also indicate that antibiotic treatments do not effectively cross the blood-brain barrier and eliminate the organism in the brain stem.

ELISA assays for Renibacterium salmoninarum were done on the Bonneville cutthroat trout and on Hayspur rainbow trout by the Eagle Fish Health Lab in November (Table 3). Low levels of BKD were discovered in one of two cutthroat trout pools and one of three rainbow trout pools. This method of testing is new and is much more sensitive than the previously used FAT testing. At the present time, it is felt that this is a subclinical level and that alarm is not warranted. Char Salvelinus and rainbow trout do not seem to be adversely affected by this pathogen at this level.

No major disease outbreaks occurred during 1991 in any of the species reared at the station. Some unseen mortality can be attributed to birds, mink,

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and raccoons, but these problems are minimal. Mink and raccoons are trapped and removed, and scare tactics are effective in keeping bird predation low.

Cutthroat trout reared at Grace Fish Hatchery do not show coldwater disease symptoms. The natural/wild egg sources for these fish may be free of this pathogen and, thus, the fish may not be infected by vertical transmission. Egg loss due to poor fertilization and lack of formalin treatment was a problem with the Bonneville cutthroat trout at Grace Fish Hatchery.

I would recommend that all Hayspur adults be injected with oxalinic acid in the future to see if the prevalence of coldwater disease could be lowered. All of the experimental fish came from adults that were not injected.

Egg mortalities in Bonneville cutthroat trout could possibly be remedied by taking sperm at St. Charles Creek in whirl-paks and using it as a back-up to males at the Blackfoot trap. Female Bonneville adults should be injected with hormones to get earlier maturation.

Lab results and the coldwater experiment indicated Aeromonas hydrophila may be causing problems. This pathogen will be researched and tested for on a regular basis. I would also like to monitor the deformity rate in catchable rainbow trout and see if this rate is high enough to warrant further investigation.

FISH STOCKED AND TRANSFERRED

This year, a large fingerling plant of Hayspur strain rainbow trout was stocked in the Snake River for the first time between Shelley and the Tilden Bridge. Adipose fins were removed on 25,000 of the fish on this 160,000 fish plant, so this plant could be evaluated. This stretch of the river has good habitat, but is mainly accessible to float fishermen. Approximately 17,000 fish were placed at numerous access points along this stretch of the river. This section of river will be shocked next year to see if any marked fish can be captured.

Soda Creek was stocked for the first time this year. Hayspur rainbow trout catchables were stocked at the bridges in Soda Springs before the season opener.

All catchable fish plants were made during the requested months with close to the numbers requested. The fingerling rainbow trout plant in Blackfoot Reservoir was cut back from the requested 500,000 fish to 402,790. This cutback was decided on as a result of fall sampling on the reservoir that yielded low dissolved oxygen values and poor numbers of trout captured in gill nets. Much of our data on the reservoir indicates it is no longer good trout habitat.

Surplus catchables above the Region 5 request numbers were planted during July to lighten raceway loads during the lowest hatchery flows of the year. Ten thousand of these fish were planted in Little Payette Lake in Region 3. Ten thousand of these surplus fish went to Region 5 waters, with Springfield

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Reservoir receiving 2,000, Bear River Riverdale 1,000, Montpelier Rearing Pond 500, Hawkins Reservoir 2,000, Devils Creek 3,500, and the Portneuf River below Lava Hot Springs getting 1,000.

Catchables ranged in length from 9.38 inches to 10.77 inches. Spring fingerling Bonneville cutthroat trout ranged from 6.08 to 6.52 inches. Spring and summer fingerling Hayspur rainbow trout plants ranged from 3.95 to 5.25 inches. Fall rainbow trout fingerlings ranged from 6.65 to 7.4 inches.

Some of the stream plant sites were evaluated for return-to-the-creel by jaw-tagging 100 fish at each site. Sites evaluated were Eight-Mile Creek, Blackfoot River-China Hat, Blackfoot River-Conlin Ranch, Bear River-Black Canyon, Cub River, Alexander Reservoir-Second Bridge, Georgetown Creek, Bear River-Riverdale, Bear River-Cove, and Bear River-Clay Point.

Little Valley Reservoir is not accessible in April when it is scheduled to be planted, and in the future will be planted in May. A tow truck had to be called to pull our 3-ton pickup out of the mud this past year. This expense will be avoided in the future.

FISH SPAWNING

Bonneville cutthroat trout and Yellowstone cutthroat trout were spawned on the Blackfoot River system (Tables 4, 5). Virtually all the Bonneville cutthroat trout eggs were taken from fish trapped on the Little Blackfoot River. This was the first year hatchery-released Bonneville cutthroat trout returned to the Blackfoot River, and these fish were all 3-year-olds and predominately males.

Some of the wild Yellowstone cutthroat trout were kept for spawning. Every 20th female entering the trap was held, with 2 males being kept for each female. The eggs from the Yellowstone cutthroat trout were hatched and planted in Spring Creek, an underseeded tributary of Diamond Creek.

Bonneville cutthroat trout were spawned from May 16 to June 17 (Table 5). A total of 110,201 eggs were taken yielding 71,490 eyed eggs. Yellowstone cutthroat trout were spawned from May 26 to June 7, yielding 11,445 green eggs that had 9,902 eggs make it to eye-up. Egg-taking water temperatures ranged from 50°F to 62°F.

FISH FEED

The fish in the upper hatchery were fed by hand, and the catchables in the large raceways were fed with a blower feeder. Rangens feed was used exclusively at the hatchery in 1991. Belt feeders on loan from Ashton Fish Hatchery were used on a trial basis during early rearing. Soft-moist feed was fed to the cutthroat trout during early rearing, and all other fish are fed dry feed.

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Studies in the past have shown greater survival of cutthroat trout fry fed soft-moist feed.

A total of 139,037 lbs of feed was fed in 1991 at a cost of \$33,285.00, which averages \$0.24/lb of feed (Table 6).

PUBLIC RELATIONS

Tours of the hatchery were given to 80 grade school students from Montpelier in May and 120 students from Hooper Elementary in Soda Springs during October. Numerous smaller tours were given throughout the year to Cub Scout and Girl Scout troops.

A Free Fishing Day clinic was held at the hatchery for children under 14 years of age. Close to 100 children caught fish out of the hatchery settling pond. A drugstore from Pocatello provided beverages and fishing gear prizes for the children during the day.

Several newspaper articles about hatchery activities were printed in the newspapers of small towns in the Bear River drainage. The Caribous County Sun wrote an article about the sucker trap and also explained the management objectives for the trout fishery on the Blackfoot River. This full, front page ad was well done and accurate in all details. The Montpelier Examiner did an article about the Hayspur strain of rainbow trout we will be planting in the area in the future. The Caribou County Sun printed an article about the fine-spotted cutthroat trout the hatchery planted in cooperation with management and several Caribou County anglers in Tin Cup Creek. A thank you letter from the hatchery personnel to the many citizens of Caribou County who helped during the trapping season on the Blackfoot River was printed in the Caribou County Sun. The Preston Citizen did a story with photographs about the reservoir plants in Franklin County being done by the hatchery.

The hatchery manager attended the St. Charles Town Council meeting in April with Dick Scully, Region 5 Fisheries Manager, to discuss screening ditches on St. Charles Creek. Angler input meetings were attended by hatchery staff in Montpelier and Soda Springs. The hatchery manager also attended a Water Resources meeting to protest further well drilling in the aquifer north of the hatchery. The hatchery manger drove around the area with local anglers to check out new fishing site suggestions and to listen to angler's concerns. Valuable historical information was attained during these trips, as well as some good possibilities for stocking sites.

SPECIAL PROJECTS

Many new projects were initiated this year with the largest and most demanding being the removal of mountain suckers Catostomus platyrhynchus from the Blackfoot River system. The hatchery crew removed and loaded approximately 100

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tons of mountain suckers. Companies willing to take the fish had to be contacted and equipment procured for this operation. Mountain suckers were also given to the general public and any other businesses that desired to haul them away. Modifications had to be made to some old fish elevators that were used to load fish out of the holding pen to the semi trailers. The public was enthused about this project and offered nothing but positive comments.

A database and field forms were built for recording trapping data. This database provides easily retrievable, detailed data about every aspect of the run from river temperatures, river depth, species, lengths, run timing, and sexual composition, to bird wounds on fish.

Hatchery managers at Grace Fish Hatchery met with Dick Scully and Gregg Mauser to design a study that would evaluate catchable rainbow trout versus fingerling rainbow trout plants in seven drawdown reservoirs in Southeast Idaho. The experiment was designed cooperatively, and field work will be initiated in 1992 so each specialized group in the study will overlap work assignments and, thus, become familiarized with aspects of fisheries work that they might not normally be exposed to. This experiment will be run for several years and should give us some valuable information about how to more effectively use hatchery fish in Southeast Idaho.

Hatchery management drove local anglers around the area to get a feel for what type of fisheries and plant sites they desired near their home towns. As a result of these visits, Soda Creek in the town of Soda Springs was tested with a live box of fish to see if the carbonated water from springs that feed into the creek would kill fish. The fish survived the first week and hatchery staff noted there was a healthy invertebrate population in the stream. The stream was planted before the season opener and a good urban fishery was created.

Soda Lake, north of Soda Springs, was also tested by placing a live box of rainbow trout in the lake. The fish survived, and it was noted by the hatchery staff that this lake is extremely productive. Management biologists are presently working on access problems to the lake. If access can be attained, it is likely we will plant this lake in the future.

Hatchery management also inspected the Snake River with an angler who frequently drift fishes the section from Shelley to American Falls Reservoir. This angler was encouraged to find plant sites for fingerlings along this stretch of river and was instrumental in attaining access through private property for the fish planting truck. He also assisted us during all fish plants and familiarized us with the river by taking us on several float trips.

The real benefit of these interactions is the fishing public has been made a part of our team and no longer exists in an adversarial role. These anglers learn a lot about our limitations and contribute valuable input to us about how we are perceived by the public.

Many of the anglers in Caribou County planted fine-spotted cutthroat trout in Upper Tin Cup Creek area. The fish were loaded out of our truck into milk bags, which were then given to sportsmen on 4-wheelers to haul to remote sites

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on the creek. Once again, the sportsmen took part in creating the fishery and, thus, are a part of our team instead of our adversaries.

The fall fingerling plants into Blackfoot Reservoir in the past have been planted at Pebble Beach. This site has very shallow water and is at the start of the narrow part of the reservoir. A new site was needed where semi trucks could turn around and also a site with deeper water. I asked Bob Rigby for permission to plant off of his private property south of the Dike Lake access and he gave me permission. This site was in deep water, birds were not a problem here, and the semi trucks hauling fish from Nampa Hatchery could plant easily without getting stuck.

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ACKNOWLEDGEMENTS

I would like to thank Doug Burton for his assistance in familiarizing me with this station. Doug transferred to the new Clearwater Anadromous Fish Hatchery in December and was replaced by Todd Garlie, who was promoted here from the Nampa Hatchery. John Lord started the year as our Fish Culturist, but moved to Montana in August and was replaced by Chris Clouse. Biological aides for the trapping season were Dave Wilson and John Schmitz. Laborers were Brian Wynn, LeeRoy Jones, and Lance Toomey. These men all put out a lot of effort to make the hatchery a success and their efforts are appreciated.

Table 1. Numbers of eggs and fish received and distributed by Grace Hatchery in 1991.

Species/ Strain	Egg source	Eggs received	Fish on hand	Fish planted	Destination
Rainbow/ Hayspur	Hayspur Hatchery	0	206,824	719,943	Region 3,5,6
Rainbow/ Hayspur	Hayspur Hatchery	752,571 (eyed)	687,941	0	Region 3,5,6
Rainbow/ Shepherd of the Hills	Egan Hatchery	0	0	76,565	Region 5
Cutthroat/ Bear Lake	Blackfoot Reservoir	0	0	59,620	Blackfoot River
Cutthroat/ Bear Lake	Blackfoot Reservoir	110,201	51,179	0	Blackfoot River
Cutthroat/ Yellowstone	Blackfoot Reservoir	11,445	0	9,903	Spring Creek
Walleye/ Osage River	Blind Pony Hatchery	200,000	0	200,000	Oneida Reservoir
Sauger/ Genoa	Genoa Hatchery	100,000	0	100,000	Oneida Reservoir
Splake/ X Soda Lake	Jenny Lake X Soda Lake	36,250	31,000	0	Payette Lake Region 1
TOTALS		1,210,467	976,944	1,166,031	

For some species, the eggs were received in 1990 and were in the previous year's report.

Table 2. Cost of production at Grace Hatchery for 1991.

Lot	Number produced	Pounds produced	\$/pound	\$/Fish
FRY				
Cutthroat/ Yellowstone 91IDCC1	9,903	3.29	102.58	0.034
Rainbow/ Hayspur 92IDR9A	178,002	93.29	31.15	0.016
92IDR9B	<u>129,375</u>	<u>45.25</u>	<u>46.57</u>	<u>0.016</u>
	317,278	141.83	37.73	0.017
FINGERLING - SPRING				
Cutthroat/ Bonneville 901DC5	59,620	5,350	0.63	0.057
91IDC5	51,179	994	11.46	0.220
Rainbow/ Hayspur 91IDR9A	156,240	4,200	1.71	0.046
91IDR9B	<u>345,140</u>	<u>10,130</u>	<u>2.23</u>	<u>0.065</u>
	612,179	20,675	2.15	0.073
FINGERLING-FALL				
Rainbow/ Hayspur 91IDR9A	16,640	2,080	2.18	0.270
91IDR9B	<u>90,950</u>	<u>14,185</u>	<u>1.43</u>	<u>0.220</u>
	107,590	16,265	1.53	0.230
<u>CATCHABLES</u>				
Rainbow/ Shepherd of the Hills 90UTR8B	76,565	31,481	0.44	0.180
Rainbow/ Hayspur 90IDR9	110,973	44,086	0.24	0.095
91IDR9A	97,187	17,543	2.22	0.400
91IDR9B	<u>109,637</u>	<u>26,419</u>	<u>1.47</u>	<u>0.360</u>
	394,362	119,528	0.86	0.260

Table 3. Lab results of necropsies done at Grace, 1991.

Brood Year	Species/Strain	Date	VH	VP	VE	BK	BF	BR	BC	PX	PW	PC	PI
1990	Cutt. LBFR	01/07	-	-	-	-	-	-	-		-	-	-
1990	Rbt./Hayspur	01/07	-	-			-	-	-				
Brood	Cutt./Bear Lk.	05/22	-	-		-							
Brood	Cutt./Yellstn.	05/26	-	-		-							
Brood	Cutt./Bear Lk.	06/03	-	-		-							
Brood	Cutt./Yellstn.	06/03	-	-		-							
Brood	Cutt./Bear Lk.	06/05	-	-		-							
Brood	Cutt./Yellstn.	06/05	-	-		-							
Brood	Cutt./Bear Lk.	06/07	-	-		-							
Brood	Cutt./Yellstn.	06/07	-	-		-							
Brood	Cutt./Bear Lk.	06/14	-	-		-							
Brood	Cutt./Bear Lk.	06/17	-	-		-							
1991	Cutt./Bear Lk.	11/14	-	-		+							
1991	Rbt./Hayspur	11/14	-	-		+				-	-	-	

Table 4. Eggs and fish received and fish transferred to other hatcheries from Grace in 1991.

Date	Eggs Received	Fish Received	Fish Transferred
<u>RAINBOW TROUT/HAYSPUR STRAIN</u>			
11/20/91	234,296	0	0
11/25/91	136,369	0	0
12/16/91	<u>381,906</u>	<u>0</u>	<u>0</u>
Subtotal	752,571	0	0
<u>SPLAKE/SODA LAKE X JENNY LAKE</u>			
12/11/91	36,250	0	0
Subtotal	36,250	0	0
<u>BONNEVILLE CUTTHROAT/BLACKFOOT RESERVOIR</u>			
05/16/91	1,431	0	0
05/21/91	2,338	0	0
05/22/91	2,226	0	0
05/23/91	2,067	0	0
05/25/91	6,080	0	0
05/26/91	7,371	0	0
05/27/91	2,106	0	0
05/29/91	8,990	0	0
05/30/91	2,338	0	0
06/03/91	13,616	0	0
06/05/91	23,650	0	0
06/07/91	4,676	0	0
06/08/91	9,686	0	0
06/10/91	4,560	0	0
06/11/91	6,346	0	0
06/12/91	9,222	0	0
06/17/91	3,498	0	0
Subtotal	110,201	0	0
<u>YELLOWSTONE CUTTHROAT/BLACKFOOT RESERVOIR</u>			
05/26/91	2,346	0	0
05/29/91	2,900	0	0
06/03/91	2,338	0	0
06/05/91	1,755	0	0
06/07/91	<u>2,106</u>	<u>0</u>	<u>0</u>
Subtotal	11,445	0	0
<u>RAINBOW TROUT/ENNIS MONTANA</u>			
09/05/91	0	150	0
Subtotal	0	150	0
<u>WALLEYE/OSAGE RIVER, BLIND PONY HATCHERY, MISSOURI</u>			
04/10/91	0	200,000	0
Subtotal	0	200,000	0
<u>SAUGER/GENOA HATCHERY WISCONSIN</u>			
04/30/91	0	100,000	0
Subtotal	0	100,000	0
TOTAL	910,467	300,150	0

GRACE91

Table 5. Blackfoot River/Little Blackfoot River cutthroat spawn taking for Oncorhynchus clarki utah and Oncorhynchus clarki bouvieri - Spring, 1991.

Date	Females Spawned	Eggt yield	Fecundity	% Eyed
<u>BONNEVILLE CUTTHROAT</u>				
5/16	1	1,431	1,431	6
5/21	1	2,338	2,338	23
5/22	1	2,226	2,226	87
5/23	1	2,067	2,067	56
5/25	3	6,080	2,027	83
5/26	3	7,371	2,457	78
5/27	1	2,106	2,106	98
5/29	4	8,990	2,247	81
5/30	1	2,338	2,338	42
6/03	7	16,302	2,329	48
6/05	10	23,650	2,365	80
6/07	2	4,676	2,338	74
6/08	4	9,686	2,422	78
6/10	3	4,560	1,520 *	43
6/11	3	6,346	2,115	55
6/12	4	9,222	2,306	24 **
6/17	<u>2</u>	<u>3,498</u>	<u>1,749</u>	<u>31</u> ***
Total	51	112,887	2,161 (mean)	65
<u>YELLOWSTONE CUTTHROAT</u>				
5/26	1	2,346	2,346	98
5/29	1	2,900	2,900	98
6/03	1	2,338	2,338	75
6/05	1	1,755	1,755	63
6/07	<u>1</u>	<u>2,106</u>	<u>2,106</u>	<u>91</u>
Total	5	11,445	2,289	86.5

* One female had some ruptured eggs in her.

** Poor sperm production from males.

*** Fertilized with sperm from Swan Creek Trap on Bear Lake.

Table 6. Feed used at Grace Hatchery during calendar year 1991.

<u>Feed Size</u>	<u>Pounds Used</u>	<u>Cost/Pound</u>	<u>Total Cost</u>
<u>DRY FEED (RANGENS)</u>			
Swim-up	50	0.3900	19.50
#1	450	0.3950	178.00
#2	3,150	0.3900	1,228.00
#3	3,950	0.3900	1,540.00
#4	5,450	0.2650	1,444.25
Coarse Crumbles	5,100	0.2650	1,351.50
1/8 Sack	13,250	0.2175	2,881.88
1/8 Bulk	24,880	0.2154	5,360.13
5/32 Sack	11,900	0.2187	2,602.50
5/32 Bulk	64,320	0.2125	13,688.00
Subtotal	132,500	0.2285	30,293.76
<u>MEDICATED DRY FEED (RANGENS)</u>			
#1 + Terramycin	600	0.5200	312.00
#2 + Terramycin	650	0.5200	338.00
#4 + Terramycin	4,000	0.3950	1,580.00
Subtotal	5,250	0.4248	2,230.00
Dry Feed Total	137,750	0.2360	32,523.76
<u>SOFT-MOIST FEED (RANGENS)</u>			
Starter	99	0.6650	65.84
1/32	110	0.6550	72.05
3/64	275	0.6250	171.88
1/16	715	0.5900	421.85
3/32	88	0.5600	49.28
Subtotal	1,287	0.6068	780.90
Soft-Moist Total	1,287	0.6068	780.90
TOTAL ALL FEED	139,037	0.2394	33,304.66